

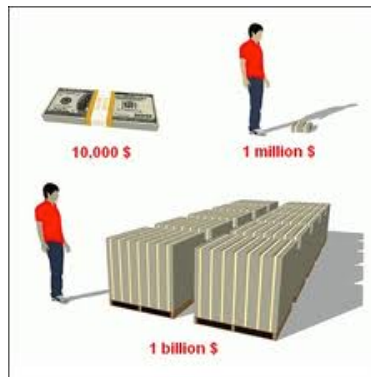
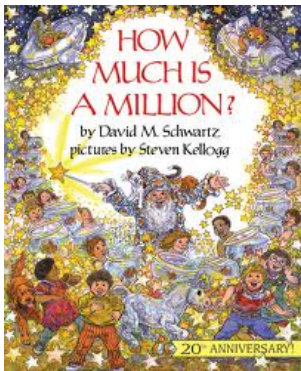
Chapter 9 Exponents & Scientific Notation

9.6b Scientific Notation

Unit Question: What is the power of powers?

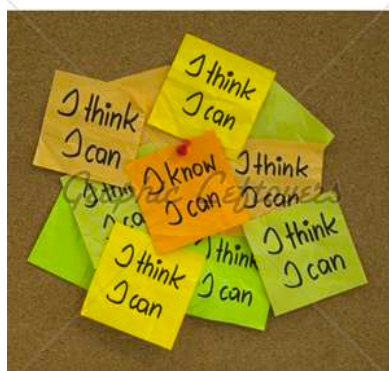
Learner Profile: Reflective

Area of Interaction: Community & Service

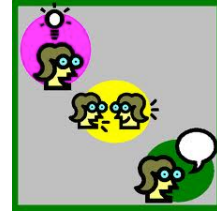


I Can Statement:

I can use the operations for scientific notation.



Think, Pair, Share



Year	2000	2002	2004	2006	2008	2010
Debt (In Trillions)	5.7	6.4	7.6	8.7	10.7	13.7

How do you write the 2000 and 2010 national debts in scientific notation?

What is the difference in the national debt between 2000 and 2010?

How many times greater is the national debt in 2010 compared to 2000?

Yesterday we focused on multiplying numbers in Scientific Notation. We did the following example.

$$(3 \times 10^{-5}) \times (5 \times 10^{-2})$$

Today we will be adding, subtracting, and dividing numbers in Scientific Notation.

Adding or Subtracting Numbers Written in Scientific Notation:

To add or subtract numbers in scientific notation with the same power of 10, add or subtract the factors.

Example 1: $(4.6 \times 10^3) + (8.72 \times 10^3)$

Find $(4.6 \times 10^3) + (8.72 \times 10^3)$. Write your answer in scientific notation.

$$(4.6 \times 10^3) + (8.72 \times 10^3)$$

$$= (4.6 + 8.72) \times 10^3$$

Distributive Property

$$= 13.32 \times 10^3$$

Add.

$$= (1.332 \times 10^1) \times 10^3$$

Write 13.32 in scientific notation.

$$= 1.332 \times 10^4$$

Product of Powers Property

Example 2: $(14.6 \times 10^3) - (8.92 \times 10^3)$

$$\begin{array}{r} 131510 \\ 0 \overline{) 14.60} \\ - 8.92 \\ \hline 5.68 \end{array}$$

$$5.68 \times 10^3$$

Adding or Subtracting Numbers Written in Scientific Notation:
To add or subtract numbers in scientific notation with different powers of 10, first rewrite the numbers so they have the same power of 10.

Example 1: $(3.5 \times 10^{-2}) - (6.6 \times 10^{-3})$

The numbers do not have the same power of 10. Rewrite 6.6×10^{-3} so that it has the same power of 10 as 3.5×10^{-2} .

$$6.6 \times 10^{-3} = 6.6 \times 10^{-1} \times 10^{-2} \quad \text{Rewrite } 10^{-3} \text{ as } 10^{-1} \times 10^{-2}.$$

$$= 0.66 \times 10^{-2} \quad \text{Rewrite } 6.6 \times 10^{-1} \text{ as } 0.66.$$

Subtract the factors.

$$(3.5 \times 10^{-2}) - (0.66 \times 10^{-2})$$

$$= (3.5 - 0.66) \times 10^{-2} \quad \text{Distributive Property}$$

$$= 2.84 \times 10^{-2} \quad \text{Subtract.}$$

Example 2: $(2.5 \times 10^{-6}) + (6.7 \times 10^{-7})$

$$(2.5 \times 10^{-6}) + (0.67 \times 10^{-6})$$

$$(2.5 + 0.67) 10^{-6}$$

$$3.17 \times 10^{-6}$$

Dividing Numbers Written in Scientific Notation:
 To divide numbers written in scientific notation, divide the factors and the powers of 10 separately.

$$\frac{10^{-8}}{10^{-7}} = \frac{10^{-8+7}}{10^0} = \frac{10^{-1}}{1} = 10^{-1}$$

3 Dividing Numbers Written in Scientific Notation

Find $\frac{1.5 \times 10^{-8}}{6 \times 10^7}$. Write your answer in scientific notation.

$$\frac{10^{-15}}{10^{15}}$$

$$\frac{1.5 \times 10^{-8}}{6 \times 10^7} = \frac{1.5}{6} \times \frac{10^{-8}}{10^7}$$

Rewrite as a product of fractions.

$$= 0.25 \times \frac{10^{-8}}{10^7}$$

Divide 1.5 by 6.

$$= 0.25 \times 10^{-15}$$

Quotient of Powers Property

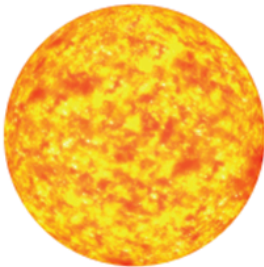
$$= 2.5 \times 10^{-1} \times 10^{-15}$$

Write 0.25 in scientific notation.

$$= 2.5 \times 10^{-16}$$

Product of Powers Property

EXAMPLE 4 Real-Life Application



Diameter = 1.4×10^6 km

How many times greater is the diameter of the Sun than the diameter of Earth?

Divide the diameter of the Sun by the diameter of Earth.



Diameter = 1.28×10^4 km

$$\frac{1.4 \times 10^6}{1.28 \times 10^4} = \frac{1.4}{1.28} \times \frac{10^6}{10^4}$$

Rewrite as a product of fractions.

$$= 1.09375 \times 10^2$$

Divide and use Quotient of Powers Property.

$$= 109.375$$

Write in standard form.

✦ The diameter of the Sun is about 109 times greater than the diameter of Earth.

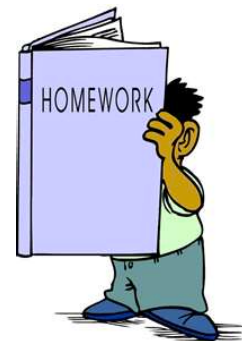
I Can Statement:

I can use the operations for scientific notation.



Assignment:

Textbook p.387a-387b
1-13.



p388 1-15 odd